

# **Policy Study on Independent Innovation of China Auto Industry**

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## **Abstract**

Independent innovation is the key factor to enhance competitiveness in China auto industry. This article is based on current status analysis of China auto industry independent innovation and it points out the problems and causes that exist in the independent innovation process. It also proposes policy and suggestions to accelerate cultivation of independent innovation in China auto industry.

**Key Word:** Auto industry; Independent Innovation; Policy

With her rapid economic growth, China is occupying more and more important status in the world automobile industry, but the prosperity of production and marketing is unlikely to cover up the crisis which the long-term healthy development of China automobile industry faces. Due to lack of independent innovation capability and Self-owned Brand's support, it is difficult for China automobile industry to change from the strong manufacturing country to powerful manufacturing country. Therefore, to guarantee the independence and security of China auto industry, it is of significance to analyze the problems and causes which exist in the independent innovation of China auto industry and ponder the direction of independent innovation policy.

## **1. Status of independent innovation of China auto industry**

Through the considerable development in the past half-century, the technical innovation level of auto industry has obtained remarkable achievement, has basically had ability of the

independently developing medium truck, and localization rate of the introduction vehicle type has greatly increased, which impelled the rapid development of China's automobile industry, but even so, compared with developed countries, the China automobile industrial technical innovation level is still extremely backward.

### 1.1 Lack of the perfect science and technology innovation system of independent development

Based on the experience of developed countries, the main body of innovation for auto industry is characterized by diversity. Under the government's guidance, the independent innovation system has high efficiency that takes the enterprise as the main body and highly effective specialized development organization as the supplement.

The large-scale state-owned enterprises of China automobile industry has the obvious superiority in technology, personnel, R&D Investment and so on, and some have even set up technology development centers, but because of the technical limitations they have not completely become the main body of technical innovation. Technology development stays in the introduction vehicle type improved and promoted, and automobile enterprise is not willing to carry on key components design and development. Although some SMEs (Small to Medium Enterprises) possess system flexibility, adhere to independent development, emphasize the independent innovation and make efforts to build self-owned brand, they mainly use commissioned development and cooperative development. Although they have obtained the intellectual property rights, it is limited to help to promote technical strength. The new R&D system of the automobile industry has not yet taken shape, which is organized by government, with the enterprise being the main body, with University-Industry-Science Partnership combining. Technological Achievements of universities and research institutions are industrialized with low conversion rate, some are even put aside for a long time.

China automobile technical force is dispersible, each kind of resources being widely distributed and division of labor & cooperation relationship among the enterprises being not clear. The government's support is insufficient for general technology of the industry, and thus is unable to carry on collaborative breakthrough to general technology, core technology and

critical technology, and it is difficult to make all superiority and science & technology resource in order to form the resultant force of China's auto industry independent innovation. This is not only a waste of manpower and equipment resources, but also disadvantageous to level promotion of the national whole innovation.

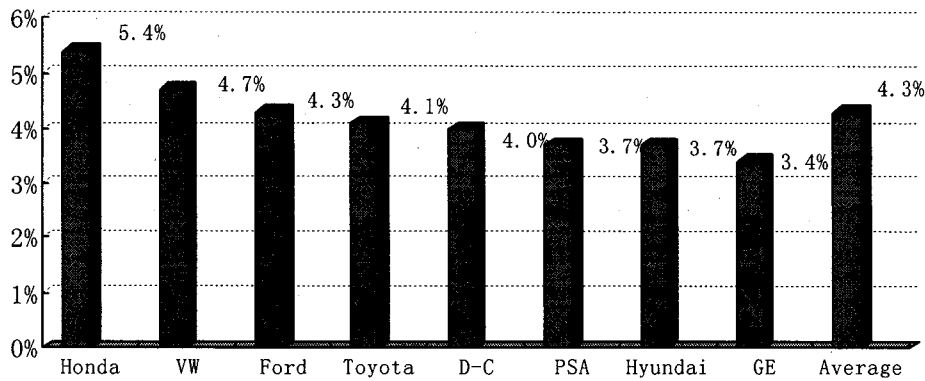
## 1.2 The shortage of investment and talent in R&D

The insufficient R&D investment of independent innovation in China auto industry is lower than that of the foreign automobile enterprise by far. R&D is the most backward areas in China automobile industry. In comparison, there is a large gap between China and automobile powerful nation such as America, Germany, Japan and South Korea, regardless of the total quantity or the ratio of the expense on automobile industry innovation. Due to the low R & D capabilities, the China Automobile Technology is always behind the world automobile technology development level.

Table 1 China Auto Industry R & D Investment, 1999-2004

	R&D Investment (Billion Rmb Yuan)	R&D Investment As % sales
1999	5.74	1.84
2000	6.77	1.9
2001	5.86	1.38
2002	8.62	1.45
2003	10.73	1.32
2004	12.93	1.42

Source: China Automobile Industry Yearbook (2005)



Source: The 2005 R&D Scoreboard

Figure 1 R&D intensity for some multinational motor corporations

Because majority of car company's R&D centers are not in China, the domestic automobile R&D personnel do not have the opportunity to bring into play their expertise to carry on the R&D practice and contact the complete flow of auto exploitation, in order that the technical ability level cannot obtain the enhancement. Therefore, the number of the domestic R&D personnel in China automobile industry is limited. Moreover, the technical ability also needs to be raised. According to statistics, R&D personnel of developed countries in Europe and America accounts for above 30% of the entire profession, but only 8% in China; Experts concerned forecast that R&D personnel shortage of auto industry in China has reached 500,000 the present stage. For example, in the next 10 years, there will be a need for 60,000 personnel of auto industry in Shanghai of China, the number will reach above 100,000 within 15 years, but the present number has not reached 20,000. On the other hand, there is R&D personnel serious waste in the large-scale state-owned enterprises and joint venture enterprises which lack the enthusiasm of independent development, because R&D personnel have no independent innovation stage to display the talent and the aspiration and they lack practical chances.

### 1.3 Lack of practical experience of the independent innovation and the accumulation of data resources

The exploitation and the design of automobile products are systematic work. The

accumulation and the practice of exploitation and design play an irreplaceable role in independent innovation. Because China automobile industry depends on multinational technology input for a long time and runs short of the independent innovation practice, the exploitation experience and the accumulation of the data resources is insufficient. In defect of database, the integration of the database of the design, the crafts and the manufacture is inadequate, which directly causes too many experiential ingredients in the design process; at the same time, there is no success and failure data of the past as reference. Therefore, China automobile manufacturers can not but be overcautious in carrying on the product structure improvement and the craft improvement, and they don't easily dare to change the original product design. Even if they have some modification, they have to conduct repeated experiments, that has seriously affected the speed and the quality of the product exploitation. Therefore, the insufficient data accumulation has become the major factor for which many domestic automobiles enterprises do not dare to carry on the independent innovation, or the main excuse for which enterprises are not willing to carry on the independent development.

Table 2 The data source of new vehicle models in Chinese market (2006)

		production number	Independent development	Technology introduction	Cooperative development
Sedan		73	23.3%	28.8%	47.9%
MPV, SUV		29	44.8%	27.6%	27.6%
BUS	Heavy and medium	39	87.2%	0	12.8%
	LIGHT	15	33.3%	13.4%	53.3%
	Mini	5	80.0%	20.0%	0
TRUCK	Heavy and medium	15	86.7%	6.6%	6.7%
	LIGHT	16	100.0%	0	0

Source: China auto industry report (2006)

At present, many miniature car enterprises and commercial vehicle enterprises have already started to establish their own databases, but they are closed to each other and lack of

communication, and they are unable to establish the basic database shared among enterprises, which is disadvantageous to their communal development and the enhancement.

## **2. Analysis of reason why independent innovation of China auto industry is weak**

Although the weak situation of independent innovation in China's auto industry is caused by many factors, the excessive protection and support for auto industry and over-reliance on introduction of technology are the major factor.

### **2.1 Intensity of competition in the market weakened by industrial regulation**

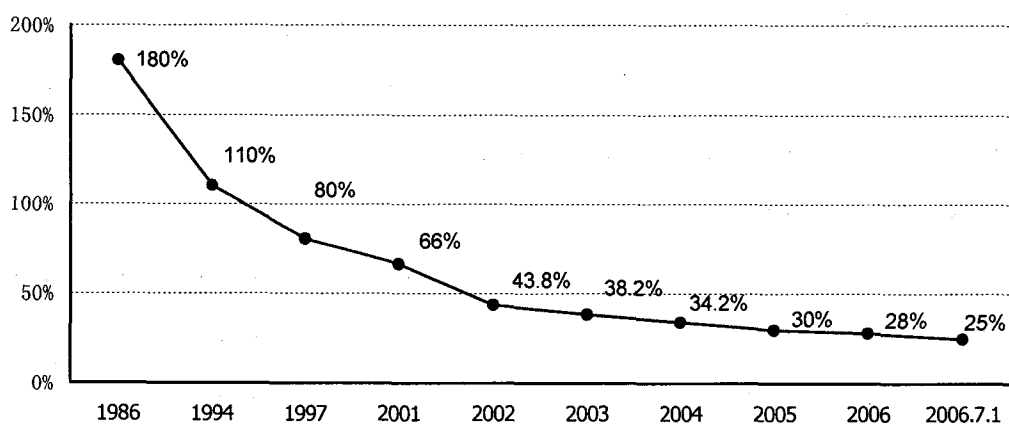
Due to technical backwardness, China automobile industry has been regarded as an infant industry protected by Chinese government. Seen from the development of the world automobile industry, the automobile profession has the obvious oligopoly characteristic, so the China auto industry policy is expected to accelerate "the China auto oligarchy" shape through administrative means.

Therefore, this kind of administrative control mainly exists in three aspects: first, the China auto enterprises have time to upgrade the technological level through trade barriers; secondly, the introduction of transnational automobile enterprise's advanced technology creates the technical study the condition for the China automobile enterprise; thirdly, through entry barriers for the domestic industry, along with restrictions on the number of enterprises, the government implements preferential policies to support a few large auto enterprises, so that they can reach the production scale of the economic output of the auto industry and improve the overall competitiveness of China's auto industry.

The trade barrier obviously has profited from the South Korea and Japanese protection policy adopted in the automobile industry start stage. But the implementation of entry barrier violates the rule of enterprise growth and the market evolution. It has neglected the fact that the only way in which the automobile oligarch as well as the oligopoly market structures are formed is the spontaneous market evolution, and it has forgotten that enterprise's scale was

gradually formed in the harsh market competition. This process was also the process of enterprise technology strength and the management level promotion.

Therefore, in a market lacking competition, even if the government uses the administrative strength to actuate company to expand the enterprise scale through reform and annexation, it is difficult for enterprises to form the enterprise's core competitiveness. In fact, the China automobile industry is under dual protection and "scale" and "concentration degree" are used as the core standard. The result of automobile industrial policy implementation is to protect the enterprises and limit the potential enterer. Earning the high profit which the demand inflation brings under the policy protection, China automobile enterprises have no need to consider the innovation even independent innovation.



Source: China Automobile Industry Yearbook

Figure 2 Chinese Custom duty on Imported Motor Vehicles (1986~2006)

Chinese vehicle import tariffs have maintained a fairly high level, particularly from the period of time from 1986 to 2001, when China auto enterprises have earned high profits. With China's accession to the WTO and the gradual reduction of tariffs, allowed to enter the auto industry, Chery, Geely and other automobile companies have to face fierce competition in the market.

## 2.2 Preferential policies leading to the deterioration of the competitive environment

China has adopted preferential policies to attract foreign investment, which created the tax inequality between joint ventures and national enterprises in the automobile industry, but the latter at present is the main independent innovation force in China automobile industry.

Sino-foreign joint venture enterprises enjoy preferential policies in China's current income tax "two exemptions and three reductions". According to the preferential policies, from the day of profit, within two years there is exempt from income tax, 15% income tax in the third to fifth year. If in the sixth year Sino-foreign joint venture enterprises increase investment, they can continue to enjoy the preferential policies; Domestic enterprises and independent brands must pay 33% income tax from the day of profit.

Compared with joint ventures, Chery Automobile with independent technology and brand increases cost of 2,400 yuan for each vehicle due to income tax and various local taxes. With total sales of 250,000 cars, Chery Automobile pays tax of several hundred million dollars more than joint ventures.

In addition, the Chinese government's preference is mainly concentrated on a few large state-owned enterprises, to which the government have given many preferential policies in many aspects, such as setting up projects, direct investment, technology transfer, taxation, bank loans, public offerings of equity financing, etc. It is difficult for private enterprises to have preferential treatment from government and financial support from state-owned commercial banks, though they have obtained remarkable achievements in recent years.

The preferential industrial policies made the state-owned automobile companies have so favorable survival environment that they lost the motivation of independent innovation, which has resulted in deterioration of private enterprises' living conditions. Thus it is difficult for the private automobile enterprises to obtain capability of continuing technological innovation.



Table 3 R&D Investment of Chinese Major Manufacturer (2004)

Manufacturer	Sales (Billion Rmb Yuan)	R&D Investment (Billion Rmb Yuan)	R&D As % Sales
SAIC	125.909	22.06	1.75%
FAW	114.531	12.83	1.12%
Dongfeng Auto	98.000	8.86	0.90%
SINOTRUCK	23.389	5.66	2.41%
Changan Auto	28.311	3.00	1.06%
Chery Auto	5.111	3.48	6.81%
Hafei Auto	6.102	1.78	2.92%
Harbin Dongan Auto	2.512	0.05	0.02%
SAIC-GM-Wuling Auto	7.003	2.30	3.28%
JAC	10.779	2.99	2.27%

Source: China Automobile Industry Yearbook (2005)

It should be noted that the situation of the artificial distortion of competitive environment has changed recently. The government has selected four key companies to support their independent innovation, which include large state-owned enterprises as well as private enterprises. But even so, we still have a good reason to think that the government is using the thought pattern of planned economy to manage and promote the enterprise's independent innovation. There are not only four enterprises that face independent innovation. Preference and support for minority enterprises inevitably results in unfair treatments for other enterprises, which is more disadvantageous to the overall level of China automobile industry independent innovation.

### 2.3 Joint venture model inhibiting the motivation of independent innovation of enterprises

At present, China automobile market is dominated by the joint venture companies formed by China state-owned enterprises and multinational motor corporations. The difference of awareness and understanding of independent innovation by governments and enterprises is the major factor that caused the weak capacity for independent innovation in

China auto industry.

The Chinese government hopes that through independent innovation, China's auto industry may further enhance the technical capacity, reduce the dependence on foreign technology, and promote related industries in the upstream and downstream and the sustainable growth of China's economy; But looked from enterprise's angle, the independent innovation is only one way, whether the enterprises need independent innovation and how to carry on the independent innovation, depends on their understanding of the development environment and their judgment about their own competitive advantage.

The high speed growth of China auto market as well as the Chinese government's dual protection for automobile industry cause the joint ventures to obtain the quite high income from the outside introduction vehicle types, whose profit margin is much higher than that of the international auto enterprises. Relatively speaking, developing independent models must increase cost and reduce profit. Meanwhile, there exists some technical excess in foreign parent enterprises, so it is not necessary to develop new vehicle type in China. Therefore the Chinese side has no opportunity to participate in the entire process of vehicle design, and can't improve the ability to innovate through actual participation.

The huge technological gap between China and foreign countries leads to the phenomenon that the car models of joint ventures are provided by the foreign parent company. After controlling the lifeline of the joint venture enterprise, foreign stockholder then controls joint venture enterprise's technical department, product support, and the parts certification right. Through assigned purchase of its parent enterprise's high price raw material, equipment, and spare parts, the foreign partner transfers profits to the subordinate enterprises of their foreign parent enterprise.

It can be seen that there is the existence of 50:50 restrictions in entire vehicle production, so through their own production in parts production they further control the technological spill and limit the enhancement of technology level of Chinese auto-parts manufacturers. If the joint ventures use the independent development pattern, the foreign partner's status will be lowered, which is disadvantageous to its parent company's profit gain. Therefore, the foreign partner of joint capital enterprise often will not have the interest in the independent innovation.

## 2.4 System restrictions on the R & D activities

Currently, China's major automobile manufacturers are basically occupied by the state capital, and there are many restrictions in technology, capital, management, which is disadvantageous to the enterprises as the main body of the independent innovation.

Modern corporate governance structure of the state-owned automobile enterprise is still not perfect, entrepreneur's long-term behavior lacks inspiration, and entrepreneur's innovation wish and the innovation power are obviously insufficient, that has largely affected the investment of research and development investment in Chinese large and middle scale automobiles enterprise; On the contrary, selecting technology introduction or simulating tactics has not only saved the high cost of research and development, but also enhanced the enterprise's short-term income by using the external advanced technology.

Under the guidance of this strategy, the China automobile enterprises gradually lose the opportunity to study in the research and development, so the innovation sense is weak and the technical ability promotion is slow.

The managers of large state-owned automobile companies play a role similar to that of government officials. One-sided performance appraisal makes the managers devoted to the short-term income, and uncertainty of tenure in office makes them disgusted with risk, therefore the strategies that they devised inevitably have distinctive characteristics of opportunism. Although in recent years China automobile industry has high profit level through massive overseas technology absorptions based on the technology introduction, the capability of absorption and independent innovation is still very weak.

According to statistics the expense proportion of technology introduction and the digestion absorption is 1: 0.06 in China automobile enterprise; but in sharp contrast this proportion is respectively 1:5 and 1:8 in South Korea and Japan. The correlation of ability of independent innovation and economic efficiency of enterprises is not high in China's state-owned auto enterprises.

### **3. Suggestion on promoting independent innovation of China automobile industry**

The independent innovation development of China automobile industry cannot lack the government support through related policy, but we must stress that these policies' goal is to guide the China automobile enterprise to step onto road of the independent innovation, improve technical absorption efficiency, help enterprises build the confidence and courage of independent R&D, and construct the market environment of encouraging enterprises' independent innovation. To promote independent innovation through policy, we must avoid managing the behavior of enterprise's independent innovation by the thought pattern of planned economy. Enterprise's technical research and development process cannot be directly involved and arranged by government, and the government should not implement one-sidedly the discrimination industry technology policy that inclines to our country enterprise or the state-owned enterprise.

#### **3.1 Building perfect market competition environment**

The motive of enterprise technical ability promotion originates from the pressure of product homogeneous competition in the market, which is the manifestation of entrepreneur's crisis consciousness and innovation spirit, and is the fast response of the enterprise to the market competition situation. Market competition is an important factor in promoting technology ability. The government must abandon the behavior which aims to protect monopoly for the reason of expanding scale and raising rate to industry concentration, and no longer use as access criteria the traditional scale of investment and planning, but use independent brands and independent development as the sole criteria. The enterprise substantially relaxes the limit of industry entry, permits each kind of investor, especially non-state investors entering. Only the sufficient investment enables China automobile industry to be competitive in the face of foreign products. In other words, only excessive investment is competitive, which has been proven in the course of the development of national household electrical appliance industry.

In fact, some emerging automobile enterprises, which break through the system limit to enter the China automobile industry, have already played catfish effect, have injected new vitality into the development of the China auto industry, and have played a valuable exemplary role for the independent development of the China auto industry. Simultaneously, they have also proven that the full competition is not equal to the building redundant project and full competition does not necessarily lead to the loss of state assets.

As the attention degree of China to the independent innovation is enhanced, the government will gradually introduce relevant policies to support the activities of independent innovation. But it must avoid managing the behavior of enterprise's independent innovation by the thinking mode under the planned economy, especially it must avoid choosing so-called "the key enterprise" as the object of support.

It is an important duty of the government to construct a fair competition environment to all entry enterprises and let the independent innovation become the most important strategy of the enterprise to enhance the competitive ability.

### 3.2 Improving the innovation performance of state-owned enterprises

In order to improve the state-owned enterprise innovation ability, we must deepen the reform of the research system and the reform of the large-scale state owned enterprise, strengthen the main body status of the enterprise R&D, raise the awareness and motivation of independent innovation, encourage the large state-owned enterprise to strive to become the main force in independent innovation. The large-scale state-owned automobile enterprises have concentrated high quality property of China automobile industry and have the abundant technical development strength and the technical accumulation. Through joint ventures and association with foreign companies, they have promoted the technical level and the R&D ability, further more the state-owned enterprise's reform has stripped the historical cloth wrapper. The profit level has been greatly enhanced. The large-scale state-owned enterprise should become a base of the independent innovation. We must bring the enterprise independent innovation ability into evaluation index system for leaders of the large-scale state owned enterprise, and inspire entrepreneur's independent innovation behavior. We may

consider bringing ratio of the expense on R&D to the sales income and the number of invention patents obtained by the enterprise every year into the year inspection and tenure inspection of leaders of the large-scale state owned enterprise, encourage large-scale state owned enterprises to cultivate their core competitiveness by means of independent innovation.

when conditions are ripe, the government should consider gradually reducing the ratio of state-owned capital to auto industry. The enormous pulling functions to national economy of auto industry cannot change the industrial competitive features, and with technology development and the advent of information age, the status of the auto industry will tend to decrease in the whole world as well as in national economic system, and the government's influence on the auto industry should be realized more by means of such the macroeconomic regulating and controlling measures as laws and regulations and taxation credit and so on, instead of state- owned capital directly holding shares, which is a method with highest cost and lowest efficiency.

### 3.3 Constructing the independent innovation system of auto industry

Developed countries of auto industry such as the United States all construct general and essential technology development facility at the national level and of government leadership; but in the reforming process of the science and technology system, many development facilities have entered enterprises, which results in lack of R&D facilities at the national level, and technology innovation ability construction lost "navigation" in the domain. As China's leading industry, the automobile industry should have a complete scientific and technological innovation system from the national to the local and from the government to the enterprise.

The government should adopt the cooperative models between industry and universities or scientific institutes, in which the enterprise should be of predominant function in order to improve the efficiency of technological innovation. The national science and technology research project should be based on the cooperation between industry and universities or scientific institutes, and the government should meet major scientific and technological needs of enterprises in the important national and local research plan, strengthen all aspects of the

innovation value chain, and effectively integrate all kinds of resources for innovation in order to enable the enterprise's independent development and innovation to obtain the effective drive in the market operation so that the technical development, the application, the industry production and the market operation form the virtuous mechanism and the independent innovation chain. The government should further strengthen the state-owned large and middle scale enterprises technology innovation organization and the ability construction, developing the enterprise-based engineering research center, strengthens the cooperation research of many kinds of forms, encourage enterprises to create strategic alliances based on technological innovation.

In the national level, the government should make efforts to establish a national platform for technical innovation, cultivate innovation ability of general technology. Through perfect and socialized intermediary service network, every main body of innovation is closely related and forms the joint innovation effort. The government should break all the barriers from the traditional department, reduce building redundant project according to the need of general technology development, speed up the technology innovation infrastructure construction, establish the technical foundation platform and the effective sharing mechanism of public information and public data and improve utilization efficiency of technology infrastructure.

### 3.4 Fostering independent innovation culture of automobile industry

For a long time, the Chinese majority enterprise's competition strategy is the low cost strategy but not difference strategy, valuing technology imitation and production process innovation instead of product innovation. Thus it is necessary to encourage and guide large and medium-sized state-owned automobile enterprises to build corporate culture by taking the innovation as the core value of enterprises and create a business-friendly atmosphere for independent innovation in the internal culture.

The government should establish various kinds of special fund to drive enterprise's independent innovation, support and guide enterprises to increase investment in research funding. Drawing on experience of innovation fund for technology-based firms, the government sets up each kind of special fund to drive enterprise independent innovation,

provides the broader channel to raise funds which are necessary for the enterprise to innovate independently. The special funds can be targeted at essential technology, the significant strategic technical innovation and the introduction technological digestion absorption in specific high-tech industries and traditional industries. The sources of these funds should be of a variety of channels, including the government, enterprises and other social funds.

In light of Chinese companies' actual situation, a small number of powerful enterprises that have advantages should carry out their own innovation in certain areas and carry on the imitation innovation in the field of comparative disadvantage. In imitation innovation, the enterprise should focus on imitation and absorbing foreign introduced technology and further cultivate the independent innovation ability. For this, in the policy and the fund, the government must encourage to digest and absorb introduction technology, innovate independently and strengthen the macroeconomic regulation and control and the management, effective suppression blind repetition introduction behavior. The government should set up the scientific research institutions composed of the manufacturing enterprises and research centers and form a chain made up of technique introduction, digestion and absorption, independent development and market operation.

#### **4. Conclusion**

The enhancement of ability to technical innovation is a complex and the arduous system engineering. Under an open system environment, the government should make and implement industry policy that promote automobile industry independent innovation in the entire automobile industry, abandon the past practices of only supporting certain enterprises, and take the overall situation macroscopic policy guidance as the direction. The government should take it as target that the government nurtures the market environment that encourages independent innovation and creates a sound mechanism for independent innovation that can promote the long term development of the China automobile industry.



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